Math Fraction Lesson Plans 4th Grade

Angela Jensen

Math Fraction Lesson Plans 4th Grade

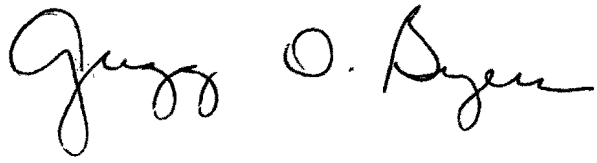
An Honors Thesis (HONRS 499)

by

Angela Jensen

Thesis Advisor

Mr. Gregg Byers



Ball State University

Muncie, Indiana

May 2007

Expected Date of Graduation May 2007

Abstract

The concept of fractions confuses many elementary students. I encountered a lack of understanding while trying to teach a lesson on multiplying fractions to a group of fifth graders at Burris Elementary. Seeing the confusion on the students' faces and watching them struggle through the lesson because they did not have any understanding of what a fraction actually is made me want to do something to change this. I thought the concept and functions of fractions should be taught at the same time to help students build a foundation for fraction knowledge. This group of lesson plans aims to teach fractions from concept to division with hands-on techniques. These lessons are designed to be taught with flexibility allowing additional time and work on particular lessons if needed.

Acknowledgements

- I would like to thank Mr. Gregg Byers for his enthusiastic support and willingness to help write this thesis.

- I would also like to thank Natascha Smith for her help during the writing process and pretending to be a fourth grader learning fractions.

Day: One **Grade Level:** 4

Lesson Topic: Introducing Fractions **Subject:** Math

Small Group Lesson

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 1: Number Sense: Students understand the relationships among numbers, quantities, and place value in whole numbers up to 100. They understand that fractions may refer to parts of a set and parts of a whole.

IN State Standard Indicator:
2.1.8 Recognize fractions as parts of a whole or parts of a group (up to 12 parts).

Lesson Objective:
- Students will be able to recognize fractions as parts of a whole and understand the meaning of the numerator and denominator.

Materials:
- Index cards with different shapes drawn on them- some shapes will be divided into three equal parts; others will be divided into three unequal parts. Have one set for each student or student pair.
- Paper and pencil for each student
- Transparency or handout of the pizza question
- Homework paper

Motivation:
- Hand a set of index cards to each student or student pair. Have the students sort the index cards by any rule they choose and then explain the rule they used. If no students sorted by equal/unequal parts, ask the students as a group to think of a new way to sort the cards. Provide prompts if needed, such as, "Each shape is divided into parts. Is there something we can do with that?"
- Once the cards have been sorted according to equal/unequal parts, tell the students the shapes divided into equal parts represent something special, while the other shapes do not.

Goal for Learner:
- "Today we are going to learn about fractions of a whole."

Procedure:
- **New Information:** Ask the class, "Where do you see fractions in the world?" The students' responses will vary. Then ask, "What does a fraction tell us?" Write the fraction ½ on the board while asking. Listen to the responses, but make sure the students

come to the understanding the bottom number tells how many parts something was broken into, and the top number tells how many of those parts we are working with. Explain the top number is called "numerator," and the bottom number is called "denominator."

- **Modeling/New Information:** Write the fraction 3/12 on the board. Ask what the number 12, the denominator, means. It means how many equal parts the whole was broken into. Give each student a Hershey chocolate bar (the kind sectioned into 12 parts). Ask the students to demonstrate 3/12 with the candy bar.
- While the students are working, draw a candy bar on the chalkboard. Ask the students to share what they think 3/12 of the candy bar is. Tell the students, "We have the fraction 3/12. I see the denominator is 12, so I want to make sure my candy bar is divided into 12 equal parts. It is. The top number, or numerator, is three, so that tells me I want three of the 12 pieces." Shade in three of the 12 pieces of the candy bar.
- **Checking for understanding/Guided Practice/Modeling:** Give the students a fraction, and ask them to draw the representation of that fraction. Tell the students, "This weekend my family got together to celebrate my sister's birthday. One of the desserts was an apple pie. When we were all done eating, 4/6 of the pie had been eaten. Draw me a picture that shows how much pie was eaten." Pause here and let the students digest the problem for a minute or two. Then, walk the students through the problem, asking them to do the work on their own paper. "First of all, what do we need to divide into equal parts?" A pie- draw a pie on the chalkboard. "How many equal parts will the pie be divided into?" Six parts- divide the pie into six parts. "What fraction did I need to figure out?" Four-sixths. "What do I need to do now to show 4/6?" Four of the six parts needs to be shaded to demonstrate 4/6 of the pie being eaten.
- **Guided Practice/Checking for Understanding:** On the overhead projector or on a handout, show the students this problem: Miss Jensen ordered three pizzas for her class to eat. The students ate two whole pizzas and 5/8 of the remaining pizza. What fraction of the pizzas was eaten? Draw a picture to represent the fraction.
- Ask the students to try this problem on their own. If any student comes up with the correct answer, have him/her demonstrate what s/he did for the rest of the students. The solution: first, draw three pizzas. Two whole pizzas were eaten, so two pizzas should be shaded in. The third pizza should be divided into eighths, and five of them should be shaded. The fraction should be 2 5/8 (the whole two for the two whole pizzas, and the 5/8 for the third pizza).

Practice/Application:

- The students will each be given a set of four word problems similar to the ones they worked on during the lesson. They will be expected to write the fraction and draw a representation of the fraction. A fifth problem will require the students to come up with their own word problem with a solution included. This fifth problem will be extra credit and may induce a class discussion the next day with the students sharing their problems.

Closure:

- Ask the students to explain what the top number and bottom number of a fraction mean and what they are called.
- Remind the students each part of a fraction is the same size as every other part.

- Ask the students to tell where they find fractions in their everyday lives.

Evaluation of Student Learning:

- The students will be evaluated on the practice/application. They will be awarded one point for writing the correct fraction and one point for drawing the correct representation of that fraction for a total of eight points. Up to three points extra could be earned for writing a clear problem and providing the correct answer and representation.

Lesson Extension:

- Ask students to come up with some of their own problems for the other students to solve. They need to be able to explain the problem to the students. This is their chance to teach their classmates and a chance for the teacher to check for understanding.

Day: Three **Grade Level:** 4

Lesson Topic: Adding Fractions **Subject:** Math

Small Group Lesson

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 2: Computation: Students solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

IN State Standard Indicator:
3.2.6 Add and subtract simple fractions with the same denominator.
5.2.2 Add and subtract fractions (including mixed numbers) with different denominators.

Lesson Objective:
- The students will be able to add like and unlike fractions using pictures and common denominators.

Materials:
- Pencil and blue and green crayon for each student
- Blank paper for each student
- Grid paper for each student
- Overhead projector (and black, blue, and green markers)
- Homework paper

Motivation:
- Ask the students what the bottom number of a fraction is called, then ask what that number means (denominator- tells how many *equal* parts a whole is divided into).
- Ask the same about the top number (numerator- tells how many parts we are working with).

Goal for Learner:
- "Today we are going to learn how to add fractions."

Procedure:
- **Modeling/New Information:** Have the students take out their pencil, crayons, and grid paper. Show the problem 3/12 + 2/12 on the overhead. Read the problem to the students and ask, "Both of these fractions have a denominator of 12. What does that tell us?" It tells us the whole is broken into 12 equal parts. "How can we demonstrate that on the grid paper?" Draw a rectangle that is three squares by four squares. Tell students, "This problem is asking us to add 3/12 and 2/12. We already have a whole divided into 12 equal parts. The first fraction is asking for three of those 12 parts, so color in three of the

12 parts blue. Now, the second fraction is asking for two of those 12 parts. Color in two of those 12 parts green. How many total parts are colored in?" There are five parts colored in. "Right, five parts are colored of the twelve, so our fraction is 5/12. This shows that 3/12 + 2/12 is 5/12."

- **Modeling:** Walk through the same procedure again with the problem 3/8 + 1/8.
- **Checking for understanding/Guided Practice:** Show the students the problem 2/6 + 3/6. Ask them to explain how to find the sum using the grid paper.
- Write the problems on the board again, horizontally, with the answer. Ask the students if they see any "shortcut" to finding the sum without using the grid paper. The shortcut is the numerators can be added together and put over the denominators. If the students cannot see this, prompt them with questions such as, "I see in each problem, both fractions have the same denominator, and so does the sum. What do you notice about the numerators?"
- **Modeling/New Information:** Have the students put away the grid paper and get out the blank paper (keep the writing utensils). Write "1/3 + 1/4" on the overhead. While drawing a representation of these fractions (using a rectangle), ask the students to draw the same representations on their paper. Color the 1/3 blue and the ¼ green. Ask, "Are these fractions the same size?" They are not. "Because they are not the same size, we cannot add them together yet. Fractions need to be the same size to add them together. So, how do we make the pieces the same size? First, look at the whole broken into thirds- the blue one. We need to take each piece and divide it into four equal pieces, like this." Divide each third into four equal sections. This is easiest to do if the whole is first broken into thirds with two horizontal lines and then into fourths with three vertical lines. Next, divide each fourth (of the green fraction) into thirds. Ask the students, "How many parts are our wholes divided into now?" Each whole is divided into 12 parts. Now, guide the students into drawing a new whole divided into 12 parts. For the blue fraction, the whole originally divided into thirds, four of the parts are now colored blue. Color four parts of the new whole blue. For the green fraction, the whole originally divided into fourths, three of the parts are now colored green. Color three parts of the new whole green. Seven of the 12 parts are colored. Seven is the numerator because it tells us how many of the parts, and 12 is the denominator because it tells us how many parts there are. This shows 1/3 + ¼ = 7/12.
- **Modeling:** Repeat modeling this process for ½ + 1/3 and 2/3 + 1/5 (this second problem is somewhat difficult- take it slowly).
- **Modeling/New Information:** Show the problem ½ + ¾, and work the problem through. Draw the ½ with the blue crayon and the ¾ with the green crayon. Divide the blue fraction's pieces both into four parts, and divide the green fraction's pieces into two parts. Draw a new fraction with eight pieces. Because there are four blue pieces, color four parts of the new fraction blue. There are six green pieces, but only four parts left of our new whole, so we need to draw a new whole. Color in the remaining four parts green and color two parts of the other whole green. We see the sum of ½ + ¾ is 1 2/8.
- **Guided Practice/Checking for Understanding:** Continue with the problems ½ + ¼, 2/3 + ¼, and 3/4 + 2/3. For each problem, ask a different student to walk the class through solving using pictures.
- **Modeling/New Information:** Write the preceding problems (except the ones with an improper fraction as the sum) with their sums on the overhead horizontally, one problem

above the next. Ask the students if they notice anything special about these problems. If they do not, tell the students to look at the denominators in each problem. The product of the denominators is the denominator in the sum. Once the students see that, show how to convert the fractions by multiplying the numerator and denominator by the same number. Explain to the students this is called "finding a common denominator." Remember, when two fractions have the same denominator, it means all parts are the same size, so we can add the numerators and keep the denominator. Work this new strategy with the problems 1/5 + 2/3, ¼ + 2/7, and ¾ + 1/3.

Practice/Application:

- Give the students a set of 10 problems. Ask them to solve each problem using both pictures and common denominators.

Closure:

- Ask the students what the process is for adding two fractions with common denominators. Why can it be done that way?
- Ask the students the two ways to add fractions without common denominators.

Evaluation of Student Learning:

- The students will be evaluated over the practice/application. One point will be awarded for each correct drawing, and one point will be awarded for each correct mathematical working for a total of 20 points.

Lesson Extension:

- Give the students a few word problems to work on. Use problems such as, "Sally is making a cake. First, she put in ¾ cup flour in the bowl, then she put in 1/3 cup flour. How much total flour did she put in the bowl?" and, "Steve ran 2/5 of a race in five minutes, and then he ran 1/3 of the race in seven minutes. How much of the race did Steve finish in 12 minutes?" Work these problems with either method.

Day: Four **Grade Level:** 4

Lesson Topic: Subtracting Fractions **Subject:** Math

Small Group Lesson

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 2: Computation: Students solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

IN State Standard Indicator:
3.2.6 Add and subtract simple fractions with the same denominator.
5.2.2 Add and subtract fractions (including mixed numbers) with different denominators.

Lesson Objective:
- Students will be able to subtract like and unlike fractions using pictures and least common denominator.

Materials:
- Overhead projector and black, blue, and green markers
- Blank paper for each student
- Pencil with eraser and blue and green crayon for each student
- Homework paper

Motivation:
- Bring in a pie, cut into eight pieces, with two pieces missing. Ask the students how much pie there would be if 1/8 of a pie would be added to the pie. Ask for a demonstration of how the students came to their conclusion. Review how to add like and unlike fractions.
- Ask the students to think about what would happen if 2/6 of the pie were taken away. Do not answer this yet; let the students mull it over for a minute.

Goal for Learner:
- "Today we are going to learn how to subtract fractions with and without common denominators."

Procedure:
- **Modeling/New Information:** Tell students they will be able to solve the pie problem in a few minutes. First, begin with common denominator problems, such as 3/5 – 2/5. Write this problem on the overhead and instruct the students to do the same on their paper. Now, draw a representation of 3/5. Remind students the denominator tells how many equal parts there are, and the numerator tells how many of those parts are being dealt with. In this representation we have three of the five parts shaded. Our problem is 3/5 –

2/5, so that tells us we need to take away two of the three parts that are shaded (the numerator tells how many we are dealing with, so that is why we only want to take away the shaded). Draw an "x" in two of the shaded parts to represent taking them away. Draw a new representation to show what the new fraction looks like. One of the five parts is now shaded; therefore, 3/5 – 2/5 is 1/5.

- Repeat this process with the problem 5/6 – 3/6.
- **Checking for understanding/Guided Practice:** Show the students the problem 7/10 – 3/10, and ask them to explain how to solve using drawings. If the students struggle, repeat with the problem 5/8 – 2/8.
- **Modeling/New Information:** Show students the problem ¾ - ½. Draw a (rectangle) representation for each fraction. As with addition, divide the parts into equal sections based on the denominator of the other fraction (divide each ¼ in half and each ½ into fourths). Each whole should now be divided into eight equal parts. Our problem tells us we need to take the second fraction away from the first. In this case, the second fraction has four parts shaded and the first fraction has six parts shaded. We need to take four of the six shaded parts away. Put an "x" on four of the six shaded parts in the drawing representing ¾. Draw a new whole divided into eight parts to show a cleaner version. Only two sections should be shaded. This shows ¾ - ½ is 2/8.
- Repeat this process with the problems 4/5 – 2/3 and 2/3 – ½.
- **Guided Practice/Checking for Understanding:** Ask the students to explain how to work the problem 3/5 – 1/3.
- **Modeling/New Information:** Review the process of finding a common denominator used for adding unlike fractions. Ask the students if it works for subtraction as well. Have the students use the previous two or three problems to test this. It will work. Show the students by modeling using the problems 2/3 – ½ and 3/5 – 1/3. Walk the students through the process if they are showing difficulty. Use more problems as necessary.
- Remind students of the pie problem introduced at the beginning of the lesson. There is 6/8 of a pie. 2/6 was taken away (say the principal ate it). Ask the students to use pictures and common denominators to figure out how much pie is left for them to share. Hand out pie for each student at the end of the lesson.

Practice/Application:

- Give the students a set of 10 problems. Ask them to solve each problem using both pictures and common denominators.

Closure:

- Remind students when working with common denominators and using drawings, only the shaded parts are "taken away" because the numerator tells us how many parts we are working with.
- Ask students if the process of finding a common denominator works the same for addition as it does for subtraction. Ask if they think it will work every time a common denominator is needed.

Evaluation of Student Learning:

- The students will be evaluated over the practice/application. One point will be awarded for each correct drawing, and one point will be awarded for each correct mathematical working for a total of 20 points.

Lesson Extension:

- Give students word problems involving subtraction of fractions. For example: Miss Jensen brought 7/8 of a pan of brownies to school. Her students ate only 3/8 of the pan. How much of the pan of brownies is left for Miss Jensen to take home? And: Sally has 2/3 of her button collection on the floor. Her mom comes through and sweeps up ¼ of the collection that is on the floor. How much of Sally's collection is still on the floor?

Day: Five **Grade Level:** 4

Lesson Topic: Fractions- addition and subtraction review **Subject:** Math

Small Group Lesson- Review/Game Day

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 2: Computation: Students solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

IN State Standard Indicator:
3.2.6 Add and subtract simple fractions with the same denominator.
5.2.2 Add and subtract fractions (including mixed numbers) with different denominators.

Lesson Objective:
- The students will review the concept of adding and subtracting fractions through an online game.

Materials:
- Personal computer for each student
- Computer attached to an overhead (for demonstrations)
- Paper and pencil for each student
- Colored pencils/crayons available

Motivation:
- Tell the students they will continue working with adding and subtracting fractions, but this time they will use a computer.

Goal for Learner:
- "Today we will review addition and subtraction of fractions by playing a game."

Procedure:
- Review how to add and subtract fractions using both like and unlike fractions.
- On the overhead, show the students to the website http://fen.com/studentactivities/MathSplat/mathsplat.htm.
- Walk the students through one or two problems, showing what happens when the answer is chosen incorrectly and when chosen correctly.
- Let the students play the game on their own for a few rounds.
- If time permits, students may be "challenged" to find another fraction game online using a search engine.

Closure:

- Review how to add and subtract like and unlike fractions.
- Ask students what they did and/or did not like about the game they played.

Day: Six

Grade Level: 4

Lesson Topic: Multiply Fractions

Subject: Math

Small Group Lesson

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 2: Computation: Students solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

IN State Standard Indicator:

5.2.3 Use models to show an understanding of multiplication and division of fractions.

Lesson Objective:

- The students will show an understanding of multiplication of fractions using pictures.

Materials:

- An overhead projector
- Paper
- Pencils
- List of fractions
- Homework paper

Motivation:

- To begin this lesson, the teacher will assess the students' grasp of multiplication by starting with simple whole number multiplication.
- Write the problem "2 x 4" on the overhead or chalkboard. Ask the students, "What is this problem asking?" The phrase looked for is "What is two groups of four?" "The multiplication sign is read as "groups of." So, what is two groups of four?" Let the students answer. "Eight, right. Now let's try this."
- Write "6 x 3" on the overhead. "What is six groups of three?" Wait for a response. "Eighteen, right."

Goal for Learner:

"Today we are going to learn to multiply fractions using models."

Procedure:

- Tell the students, "Here's our problem. Wayne has two cakes, but he only frosts 1/3 of each cake. How much cake did Wayne put frosting on? What can we use to solve this problem?" The answer looked for is multiplication. Addition can be used, but focus on multiplication.

- **Modeling/New Information:** Write "2 x 1/3" on the overhead. Ask the class how to read this problem. "Class, how do I read this problem?" Here the response looked for is "two groups of one-third." "We'll read this problem as 'two groups of one-third.' What do you think the answer will be? Drawing a picture, let's work on this problem." Work this problem out for the students to see. One way to model this is to draw two wholes divided into thirds and shade one-third from each whole. Total, we have two of the thirds shaded, so the answer is 2/3. Draw a new fraction to represent 2/3.
- **Checking for Understanding:** Introduce a new problem. "Class, let's look at this problem now." Write "3 x 2/5" on the overhead. "Sally, will you please read this for us." This should be read "three groups of two-fifths." "Again, drawing a picture, find for me how many three groups of two-fifths is?" Walk around the room again while students are working to monitor their progress.
- Once the students seem to have a grasp of this problem, ask another student to share his/her answer with the class and the thought process behind it. "Stephen, I see you have found an answer for three groups of two-fifths. Will you please go to the overhead and show us how you got that answer?" Here I expect Stephen to have divided three pieces into fifths. He then would have taken two pieces from each whole and made a new whole with one-fifth to the side. His answer is one and one-fifth or 6/5.
- **Checking for understanding/Guided Practice:** Allow the students to work one or two more problems multiplying a whole times a fraction (the amount depending on time and the students' understanding of the problems). Use the problems 1/4 x 2 and 1/2 x 6. Be sure to ask if there are any questions.
- **Modeling/New Information:** "Now let's look at multiplying a fraction times a fraction." Write "3/4 x 2/3" on the overhead, and call on a student to read it aloud. "Johnny, will you read this for us, please?" This problem is read, "What is three-fourths of two-thirds?" "What do you think the answer will be. Find three-fourths of two-thirds." Walk around the room while students are working and monitor their progress. If students seem to be struggling, model the solution for them. When most of the students seem to have found an answer, ask a student to show his/her work on the overhead. "Joey, I see you have found three-fourths of two-thirds. Will you please show us what you did on the overhead?" When Joey is done, ask a student who found the answer a different way to show that to the class. "Is there anyone who found the answer a different way? Will you show us what you did, please?" Here I expect at least one of the students in the class to have drawn a rectangle or square sectioned into thirds. Two of those thirds should be shaded or somehow distinguished. This section of two-thirds should be divided into four pieces. Because each part of a fraction should be equal pieces, we need to divide the other section also. Now, because our problem is ¾ x 2/3, we need to shade again three of the four shaded pieces. These last three pieces of the whole are three-sixths of the whole, so the answer is three-sixths.
- **Guided Practice/Checking for Understanding:** Give the students the problem " 1/2 x 1/4" and repeat the process stated above.
- **Modeling/New Information:** Ask the students if they see a "shortcut" that can be used instead of drawing a picture to multiply fractions. Write a few of the multiplication problems on the board horizontally. If the students do not see the shortcut, prompt them with questions such as, "I see the denominator of the product is the product of the

denominators in the problem. What do we need to do to the numerators?" Practice this new process with a few of the problems used earlier so students can see the connection.

- **Guided Practice/Checking for Understanding:** Play a game (it has no name). The entire group will be asked a multiplication problem, and each person works the problem on a piece of paper or with pattern blocks. There will be a time limit of one minute per question. After a minute, or after each student has an answer, whichever is first, the students tell the answer they got. One point is awarded to each person with the correct answer. If a group gets an answer wrong, work the problem together as a group. Have a student who got the answer correct explain their procedure for the group. Problems to use: 1/3 x 3/4, 2/3 x 3/4, 1/3 x 3/6, and 3/4 x 4/5.

Practice/Application:

Give the students a list of 5 multiplication problems. Ask them to show the work they do to solve it. If they solve it in their head, ask them to think about what they thought about and write that down.

Closure:

- "Before we close up Math for the day, remind me what we worked on today." We worked on multiplying fractions using models.
- "How did we model the multiplication?" We used drawings on paper.

Evaluation of Student Learning:

The students will be graded on the practice/application of showing their understanding of multiplication of fractions using models using the included rubric.

Lesson Extension:

Tell the students, "We may need to know how to multiply or divide by fractions in real life. For example, let's say that we have a ½ gallon container of water, and we use ¼ of the container to water the plants. How much water total was used to water the plants?"

Rubric for Evaluation

		5 pts	4 pts	3 pts	2 pts	1 pt	0 pts
Multiplication	Correctly Modeled	5 correctly modeled	4 correctly modeled	3 correctly modeled	2 correctly modeled	1 correctly modeled	None were correctly modeled
	Correctly Answered	5 correctly answered	4 correctly answered	3 correctly answered	2 correctly answered	1 correctly answered	None were correctly answered

Score: _____/10

Day: Seven **Grade Level:** 4

Lesson Topic: Divide Fractions **Subject:** Math

Small Group Lesson

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 2: Computation: Students solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

IN State Standard Indicator:

5.2.3 Use models to show an understanding of multiplication and division of fractions.

Lesson Objective:

- The student will show an understanding of division of fractions using pictures.

Materials:

- An overhead projector
- Paper
- Pencils
- List of fractions
- Homework paper

Motivation:

- To begin this lesson, the teacher will assess the students' grasp of division by starting with simple whole number division.
- Write the problem "8 divided by 4" on the overhead or chalkboard. Ask the students, "What is this problem asking?" The phrase looked for is, "How many fours are in eight?" "We see the division sign and ask ourselves 'How many of the second number are in the first number?' So, how many fours are in eight?" The answer is two, and the students should answer the question.
- Write "4 divided by 1" on the overhead. Ask, "How many ones are in four?" The answer is four.

Goal for Learner:

"Today we are going to learn to divide fractions using models."

Procedure:

- **Modeling/ New Information:** Ask what this problem means: "6 divided by 2." This problem means, "how many twos are in six?" The answer is three.
- Write this problem on the overhead "3/4 divided by ¼." This problem is asking, "How many 1/4 s are in ¾?" "What do you think the answer will be? Here is how I would solve

this problem. First, I would draw a whole and divide it into fourths, like this (draw this on the overhead). Next, I notice my problem is asking for something in ¾, so I will shade in ¾ of my figure (draw dots, don't really shade it). Ok, let's look at our drawing. How many ¼ pieces are in the shaded area? There are three, so our answer to how many 1/4s are in 3/4, or ¾ divided by ¼, is three."

- Work the problem 3/8 divided by 1/8 as a group. Do as many problems together as necessary.
- **Checking for Understanding:** Give the students the problem 4/6 divided by 1/6 to work on (the answer is four). Ask for questions.
- **Checking for Understanding:** Now, divide by a whole number. Give the students the problem ¾ divided by 5, and let them try to figure it out (they might not know, and that is perfectly fine). Model if needed. Here's how this problem would work: draw a whole divided into fourths. Shade ¾. The problem wants to know how many 5s there are, and we only have one (whole), so we need to draw four more wholes. Here it is helpful to divide each whole into fourths. Now we have five wholes drawn, and one of them has ¾ shaded. With each whole divided into fourths we have 20 parts, and there are only three parts shaded, so our answer is 3/20. If a student gets the right answer without help, have him/her come to the board and explain how he/she got that answer and why it works (the explanation is very important here, whether done by the teacher or student).
- Work the problem 2/3 divided by 4. Do as many problems together as necessary.
- **Guided Practice/Checking for Understanding**: Play a game (it has no name). The entire group will be asked a multiplication or division problem, and each person works the problem on a piece of paper or with pattern blocks. There will be a time limit of one minute per question. After a minute, or after each student has an answer, whichever is first, the students tell the answer they got. One point is awarded to each person with the correct answer. If a group gets an answer wrong, work the problem together as a group. Have a student who got the answer correct explain their procedure for the group. Problems to use: ¾ ÷ ½, 5/6 ÷ 2/3, 7/8 ÷ ¼, ½ ÷ 3, 2/5 ÷ 6.

Practice/Application:

Give the students a list of 5 division problems. Ask them to show the work they do to solve it. If they solve it in their head, ask them to think about what they thought about and write that down.

Closure:

- "Before we close up math for the day, remind me what we worked on today." We worked on dividing fractions using models.
- "How did we model the division?" We used drawings on paper.

Evaluation of Student Learning:

The students will be graded on the practice/application of showing their understanding of division of fractions using models using the included rubric.

Lesson Extension:

Ask the class, "We may need to know how to divide by fractions in real life. For example, let's say that we have ½ gallon of milk, and we want to pour it into ¼ gallon cups, how many cups will we need?"

Rubric for Evaluation

		5 pts	4 pts	3 pts	2 pts	1 pt	0 pts
Division	Correctly Modeled	5 correctly modeled	4 correctly modeled	3 correctly modeled	2 correctly modeled	1 correctly modeled	None were correctly modeled
	Correctly Answered	5 correctly answered	4 correctly answered	3 correctly answered	2 correctly answered	1 correctly answered	None were correctly answered

Score: _____/10

Day: Eight **Grade Level:** 4

Lesson Topic: Fractions- multiplication and division review **Subject:** Math

Small Group Lesson- Review/Game Day

INTASC Principle #1- Understands Content: The professional educator understands the central concepts, tools of inquiry, and the structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

IN State Standard 2: Computation: Students solve problems involving multiplication and division of whole numbers and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals.

IN State Standard Indicator:
5.2.3 Use models to show an understanding of multiplication and division of fractions.

Lesson Objective:
- Students will further develop their concept of multiplication and division of fractions through a game.

Materials:
- Pre-made game board (see template provided)
- Two dice
- Paper and pencil for each student

Motivation:
- Review how to multiply and divide fractions. Tell students they will work with multiplication and division again today, but it will be done a little differently than before.

Goal for Learner:
- "Today we are going to multiply and divide fractions while playing a game."

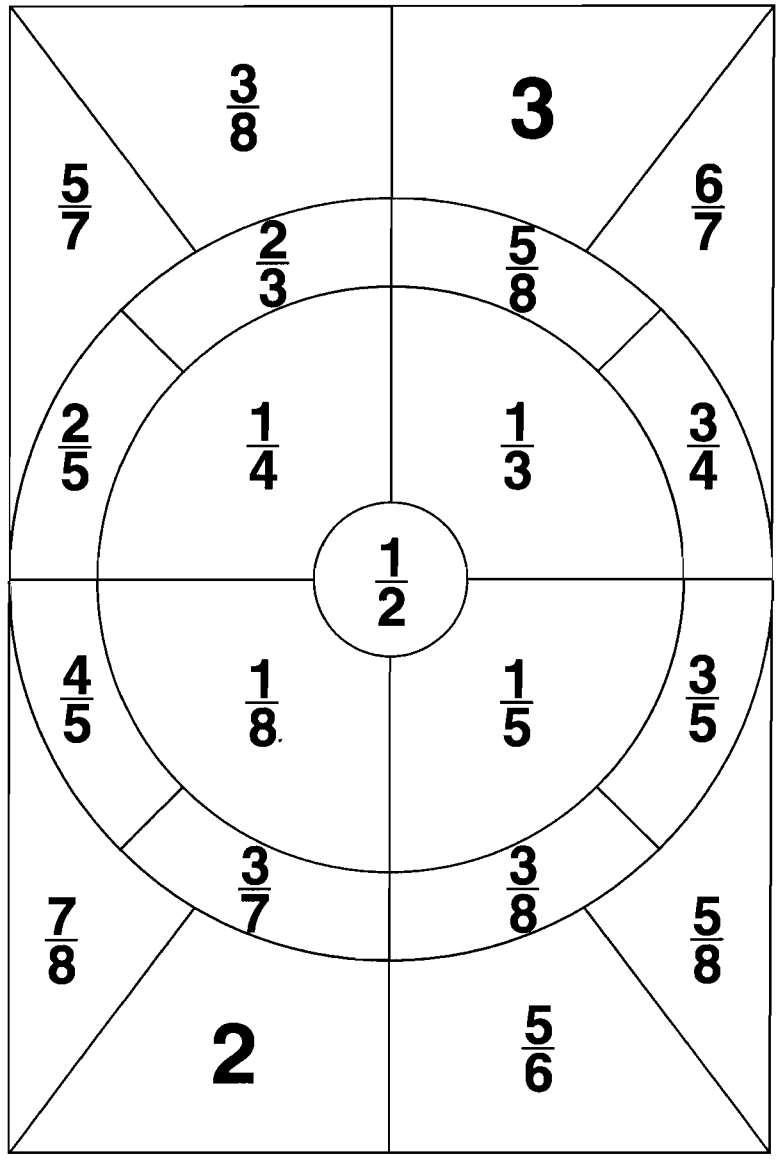
Procedure:
- With the game board on the floor, have each student or student pair roll the dice to see who goes first.
- On a player's turn, the dice are rolled onto the game board. The two fractions on which the dice land are then multiplied together. A correct answer gains one point. Play continues clockwise. The first student (or student pair) to a predetermined number of points wins.
- For the next round, the numbers can be divided instead of multiplied. Before playing this round, the students may need to be taught how to find the larger fraction (find a common denominator the same way done through addition/subtraction of fractions).

Closure:
- Review how to multiply and divide fractions.

The Game Zone

Student Edition, p. 269

Multiplication Chaos



BIBLIOGRAPHICAL INFORMATION:

Instructional:

Anthony, Susan C. (2001). *Introducing fractions*. Retrieved April 19, 2007 from, http://www.susancanthony.com/Resources/fract/fractions.html.

Brodie, Julie Pier. *Constructing Ideas About Fractions* (pp. 75-77). Grades 3-6. Chicago, IL: Creative Publications.

Englert, Gail. (N/D). *Working with fractions*. Retrieved March 20, 2006, from http://mathforum.org/t2t/faq/gail/fractions8.html.

Glencoe Mathematics (2004). *Mathematics applications and concepts course 1*. Teacher wraparound edition. New York, New York: McGraw-Hill Companies.

Griffith, Paul. (2002). *Building intuitions about fraction operations*. Retrieved March 20, 2006, from http://www.europa.com/~paulg/mathmodels/eggmult.html.

Van de Walle, John A (2004). *Elementary and Middle School Mathematics: Teaching Developmentally* (pp. 271, 273). 5th edition. U.S.: Pearson Education Inc.